Sandy River Delta Habitat Restoration Project

Annual Report
2001

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Lower Columbia River Wetlands Restoration and Evaluation Program, Project 99-025
Sandy River Delta Riparian Forest Restoration: Project 99-026

2001 ANNUAL REPORT

This annual report summarizes the work from 1997 to develop the context for the work accomplished in 2001. This work was funded by the Bonneville Power Administration (BPA), the USDA Forest Service (FS), Ducks Unlimited (DU), Foundations, non-profit organizations, and many hours of volunteers.

Introduction

The Sandy River Delta is located at the confluence of the Sandy and Columbia Rivers, just east of Troutdale, Oregon. It comprises about 1,400 land acres north of Interstate 84, managed by the USDA Forest Service, and associated river banks managed by the Oregon Division of State Lands. Three islands, Gary, Flag and Catham, managed by Metro Greenspaces and the State of Oregon lie to the east, the Columbia River lies to the north and east, and the urbanized Portland metropolitan area lies to the west across the Sandy River.

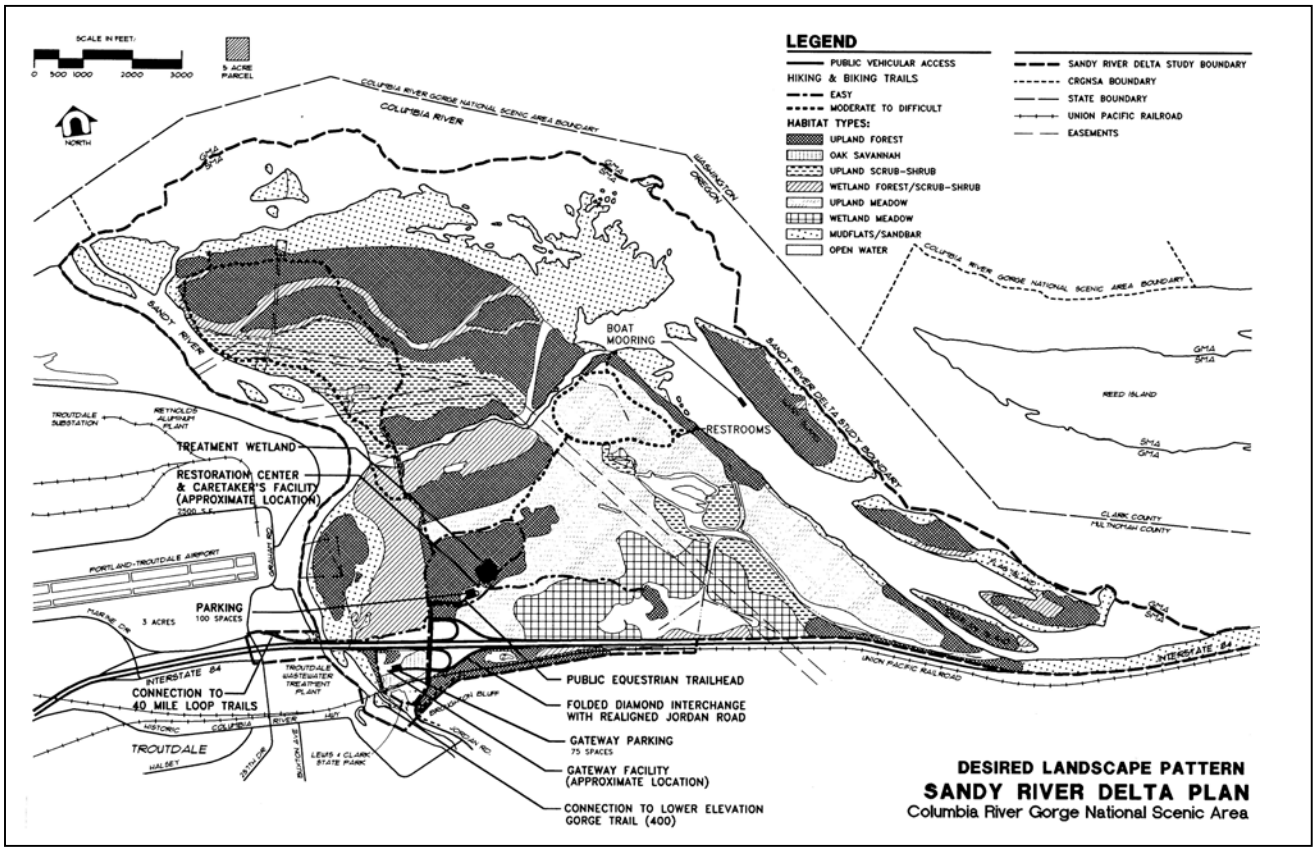
Sandy River Delta was historically a wooded, riparian wetland with components of ponds, sloughs, bottomland woodland, oak woodland, prairie, and low and high elevation floodplain. It has been greatly altered by past agricultural practices and the Columbia River hydropower system. Restoration of historic landscape components is a primary goal for this land. The Forest Service is currently focusing on restoration of riparian forest and wetlands. Restoration of open upland areas (meadow/prairie) would follow substantial completion of the riparian and wetland restoration.

The Sandy River Delta is a former pasture infested with reed canary grass, blackberry and thistle. The limited over story is native riparian species such as cottonwood and ash. The shrub and herbaceous layers are almost entirely non-native, invasive species. Native species have a difficult time naturally regenerating in the thick, competing reed canary grass, Himalayan blackberry and thistle. A system of drainage ditches installed by past owners drains water from historic wetlands. The original channel of the Sandy River was diked in the 1930's, and the river diverted into the "Little Sandy River". The original Sandy River channel has subsequently filled in and largely become a slough.

The FS acquired approximately 1,400 acres Sandy River Delta (SRD) in 1991 from Reynolds Aluminum (via the Trust for Public Lands). The Delta had been grazed for many years but shortly after FS acquisition grazing was terminated while a master plan and Environmental Impact Statement (EIS) were developed for the site. During the following three years, the vegetation changed dramatically as a result of cessation of grazing. The dramatic changes included the explosive increases of reed canary grass monocultures in wet areas and the expansion of Himalayan blackberries throughout the site.

The completed comprehensive management plan (*Sandy River Delta Plan* and *EIS,* 1996) identified a landscape restoration plan, recreation facilities (trails and parking area), I-84 transportation improvements, and a 'gateway' to the Columbia River Gorge National Scenic Area (CRGNSA). The master plan envisions wetland, riparian forest, shrub-scrub, upland forest, and upland meadow restoration. Riparian forest and wetland restoration were identified as first priorities. The long-term objectives are re-establishment of 600 acres of Columbia River bottomland riparian forest (dense stands of black cottonwood, will and ash), and re-establishment of about 200 wetland acres and associated upland habitat. We also intend to monitor and evaluate restoration success. Fig. 1 illustrates the desired landscape pattern for the Delta as illustrated in the EIS.

Figure 1: Sandy River Delta Desired Landscape Pattern



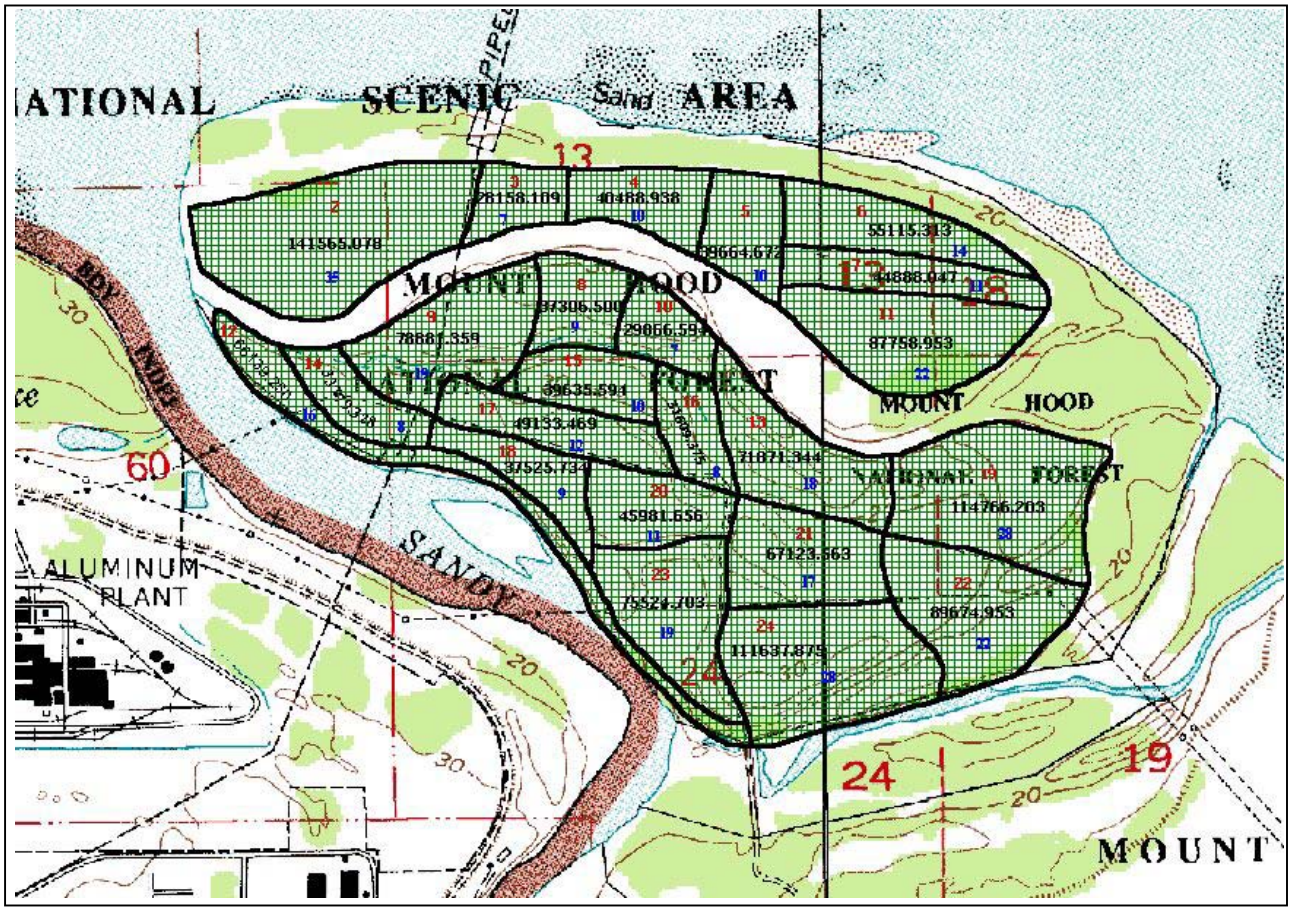
Riparian Forest Restoration (Sundial Island)

The north island (Sundial island) was envisioned to become re-forested to the maximum extent possible. Clearly, it would not be possible to reforest under the transmission lines so this area was designated to be planted with shrubs. The old sloughs through the north island would be left intact as future flood channels.

The species composition of the forest was designed to replace the native gallery hardwood riparian forests that were commonly found along the lower Columbia. This forest type has been decreasing over time and large blocks of this gallery forest are largely absent as more land is cleared or converted to other uses. Furthermore, this habitat type is important habitat for many neo-tropical migrants, which, in fragmented habitat, are prone to increased cowbird predation. The SRD offered a rare opportunity to re-establish large blocks of this habitat type. The riparian forest is primarily black cottonwood and Oregon ash with a diversity of other small trees and shrubs, such as willow spp., dogwood, ninebark, Indian plum, etc.

The Forest Service outlined the initial reforestation in a flexible five-year plan, which is illustrated in Fig.2 below.

Figure 2: Riparian Forest Restoration Design



The reforestation area was divided into blocks indicating when the areas were to be planted and when the associated activities were anticipated to occur. This type of out-year planning had to be very flexible to accommodate yearly changes, a result of adaptive management. Summarized below in chronological order are the yearly accomplishments and notes that help illustrate our approach to adaptive management.

1997

Summer:

Site Preparation:

All blackberries within A1, A2, and A3 were mowed down in preparation of the planting effort. It was believed that the young trees would get established quickly and over top the blackberries with no further site preparation required.

Fall:

Planting:

Friend of Trees (FOT) planted the first 7 acres of the reforestation effort. Unit A1 was planted with volunteers.

Results:

1. **No mats, deer, or mouse protection were utilized. However, after the initial planting, we decided that the grass was too heavy not to require mats. Therefore, we decided that planting mats should be used in all future plantings to help reduce competition with grasses and weeds.**
2. **This planting scheme represented about 850 –900 trees/shrubs per acre (about 8 ft spacing).**

1998

Spring:

Planting:

FOT planted 6-7 acres in unit A2. Mats were used.

Volunteers planting trees.

Summer:

Site Preparation:

Continued site preparation during the summer of 1998. Blackberries were mowed by hydro-ax in A3, A4, A6, and B1.

Results:

During the summer of 1998, monitoring showed:

1. **The mats were indeed controlling the vegetation immediately around the trees.**
2. **We also began to see severe damage from deer browsing and girdling from mice. As a result and after consulting other nurseries and reforestation efforts, we decided that vexar tubes would be used for protection from deer and the use of mouse mesh to prevent girdling.**
3. **Furthermore, the browsing had severely delayed the anticipated growth of the young trees and the blackberries were clearly overwhelming the planting. Mowing alone would not be sufficient for site preparation.**

Fall:

Planting:

FOT used volunteers and Americorps crews to plant A3 (7 acres.). All planting was completed with mats, vexar tubes and mouse mesh.

1999

Spring:

Planting:

1. FOT used Americorps and volunteers to finish planting A3 and most of A4 (13 acres) and part of A5.
2. Portland Bureau of Environmental Services (BES) planted 9 acres in B1.

Summer:

Site Preparation:

Vegetation cleared by hand crews around plantings in A block and B1. No hydro-ax clearing because we were having a difficult time getting the follow-up spraying completed. Mowing alone is not sufficient (will continue hydro-ax clearing when the spraying can be accomplished in a timely manner). Mowed about 20 acres in E2 with rented tractor. Rear flail mower was not suitable for high grasses as found at Delta, especially if high water as a result of dam discharge would restrict entry to Sundial Island. in early Spring (April- June).

Results:

Continued monitoring highlighted three important points:

1. **The vexar tubes did appear to be helping reduce deer damage, but as the trees grew above the vexar tubes, deer browsing continued to be so severe that the trees could not grow beyond the vexar tubes. We realized that a new approach had to be developed. We began to investigate the use of spray for deer control; but the advice we received was mixed and no one had experience with deciduous hardwoods and they expressed hesitation due to the fact that the spray would be on the leaves and**

they would be shed in fall. Another possible solution was to fence the trees. Cost estimates on fencing the larger area as opposed to the individual trees was explored and it was determined to be more cost effective on an individual basis (each cage could then be moved from one tree to another at a later time). No immediate changes to the plantings were initiated, but further careful monitoring would be completed.

2. **Mice continue to girdle even with mouse mesh. Further investigation showed that the mice were climbing up the mouse mesh to reach the young stems and they were using the cover under the mats to concentrate their activities around the young trees. This increased activity was assumed to be increasing the number of tree being girdled. Consequently, we decide to try tin foil wrapped around tree base, a technique others were finding useful.**
3. **As a result of the above mentioned problems, the young trees were not growing fast enough to escape the competition with the grasses and reed canary grass. Consequently, we were having to use crews to weed around all plantings and the cost of weeding these plantings was beyond our financial capabilities. We had to find some other solution. Exploring new ideas such as taller trees, spraying a site first to eliminate the non-native grasses followed by native grass seeding prior to planting, and the need to plant in rows to allow for tractor mowing were now being seriously considered. The use of taller stocks and a pilot study with establishing native grasses would be tried immediately.**

Fall:

Planting:

1. FOT finished planting all of A4 and planted about 3-5 acres in B2. Experiment with tall tree 6-8 ft as a way to escape deer browse problems. These tall trees were planted in B2.
2. BES site prepared, sprayed, and grass seeded (with native grasses) the mitigation site (a 5 acre area designated as a mitigation site for a wetland lost in Troutdale). This was to also be a pilot study on the feasibility of this method for use throughout the Delta.

2000

Results:

1. **Over the winter more research and discussion resulted in our decision to try cages on individual trees. It was decided to try this on the oak plantings planned for Spring 2000.**
2. **In addition, our planting with larger tree stocks was very promising and sustained only light deer damage on the lower branches.**
3. **Furthermore, the tin foil appeared to be the most effective method thus far in reducing girdling.**
4. **The need to mow with a tractor was becoming increasingly clear. Purchase of a tractor and mower was explored and completed.**

Spring:

Planting:

1. BPA and FOT planted oaks near corral. BPA planted in late April on Earth Day. Panted over 200 oaks. All were caged.

2. BES planted wetland mitigation site.

Cages to protect young trees from deer browsing.

Summer:

Site Preparation:

60 acres of blackberries were mowed by Hydro-ax and 60 acres mowed by tractor using a new side mounted mower suitable for high grass.

Fire:

Wild Fire burned close to 200 acres of sundial. All of the 9 acres that were planted by BES in 1998 were lost.

The 2000 fire burned about 200 ac including 9 ac. of plantings.

Results:

The opportunity presented to us as a result of the fire and as a result of our monitoring and experience learned over the past 4 years, triggered us to jump ahead with the idea of planting in 20 ft rows, with large trees (4-6 ft high), no mats (since the rows would be mowed by a tractor), with cages on all smaller trees or shrubs, and tin foil on all plants. The number of tree per acres was about 200, or at a spacing of roughly 20 ft by 20 ft. This scheme would establish a canopy and would allow for inter-planting of shrubs and/or trees. The cost of each tree is on average $6.00 which is close to the cost of a small tree and a cage. However, the cost of caging and the cost of cage removal would then make the cage scheme more costly. The survivability of the large trees as compared to the small trees must be monitored over time to adjust the economic comparison.

Fall:

Planting:

Americops designed and laid out the 20ft rows and planted about 15 acres with tall (6-8ft) trees. All planting was on 20 rows to facilitate tractor mowing. All plants received tin foil wrap and all small trees (such as oaks) and shrubs were caged. Units planted included D1, and portions of B4 and B3. Furthermore, crews began to cage as many as one third of the surviving trees in units A2, A3,and A4.

Taller tree stocks planted to get above grass cover and deer browse level.

Site Preparation:

30 acres of blackberries, mowed by hydro-ax during the summer, were sprayed.


Mowing reed canary grass.

2001

Spring:

Planting:

More caging was completed in A3 and A4.

Summer:

Site Preparation:

Mowed with tractor the plantings in D1 and portions of B3 and B4. Mowed additional areas (B3, B5 and B1) adjacent to these for fall plantings.

Monitoring:

Set up permanent monitoring transects in D1 to monitor survival of larger planting stocks. First years data showed 85% survival. This data must be considered with caution as these larger planting stocks could leaf out the first year but not survive to the second. Next year's data will more accurately indicate survival rates. Set up permanent monitoring plots in A3. Data will be discussed when compared to 2002 data.

Data collected from a 5 acre wetland mitigation site (not related to this reforestation effort) planted in 2000 at SRD helps to further illustrate dynamics of tree planting in the reed canary grass sites. At this site, the Oregon ash, willows, Indian plum, and cottonwoods all have been heavily browsed, while the alders (which are clearly less palatable to the deer) have shown rapid growth and are presently 10 to 20 ft tall. Alders, in fewer numbers, have been planted on Sundial Island but have not shown such rapid growth and have suffered more from what we believe is drought related problems. The use of alders will be examined more carefully; but we cannot loose sight of our objective of establishing the hardwood gallery forest in which alder is a minor component.

Another point of interest with this mitigation site was the approach of eliminating essentially all vegetation (a broad cast spray and discing were used) before reseeding with native grasses followed by tree, and wetland flora planting. This approach worked very well initially; but by 2002 the reed canary grass and some young blackberries were becoming well established once again. Spot sprays can be effective against blackberries but spraying the reed canary grass becomes more problematic since the sprays also affect the desirable native grasses. Spot spraying will be completed during 2002 and the effectiveness of this approach will continue to be evaluated. The beauty of this approach is that it re-establishes more of a native understory from the start.

Mitigation site showing native grasses and excellent alder tree growth (middle of photo, trees about 12 to 15 ft. in height).

Results:

1. **The growth of plants caged in A2, A3, and A4 was, in some cases, very promising. Some cottonwoods, and willows were showing 2-3 ft leader growth as a result of no browsing. Clearly, some plants had become so stunted that it is expected to take a few years for them to respond to the cages. The planting of Unit D1 and portions of B3 and B4, also were very encouraging. Deer damage was slight, girdling was minimized and the majority of the trees survived one of the worse drought years in 40 years.**
2. **Concern with competing vegetation around each plant continues. In the absence of mats, the use of round-up herbicide will be examined and compared to no herbicide treatment.**
3. **As a result of mowing and continuing vegetation management, several species of birds, such as American kestrel and marsh hawks, have been seen more frequently than in the past 8 years.**

Fall:

Planting:
Americorps planted about 10 acres in units B1, B4, B3, and inter-planted shrubs in D1, B1, B4, and B3. All of the trees were 5–8 ft tall while shrubs were small and required cages. All plants were fitted with tin foil.

2002 and Beyond

We will continue our riparian reforestation program, with annual accomplishments commensurate with annual funding. A pilot study to replant 50 ac. with the method used in the mitigation site, as mentioned above, will be initiated during the summer of 2002.

Riparian Forest Restoration Partnership Summary 1996 -2001
The agencies and groups and the amounts they have committed to riparian forest restoration (between 1996 and 2001) include:

- Friends of Trees: volunteer planting, maintenance, monitoring crews (value: $27,000)
  - Metro: cash grant of $16,000 for plant material (through Friends of Trees).
  - Weyerhauser Foundation: $2,100 for plant maintenance (through Friends of Trees)
- Lower Columbia River Estuary Program: cash grant of $14,500 for plant material.
- American Forests Global Releaf Program: cash grant of $7,800 for plant material.
- National Fish and Wildlife Foundation: cash grant of $1,500 for plant materials.
- Forest Service "Chief's Natural Resources Agenda": cash grant of $10,000 for plant materials.
- Forest Service “National Demonstration Area”: special funding approximately $65,000.
- US Forest Service: landowner, site preparation, project oversight/monitoring (value: $30,000+).

Riparian Forest Restoration Summary: Acres per Year by Activity

Activity	1997	1998	1999	2000	2001
Site Prep	21	43	30	150	130
Planting	7	14	34	25	20
Maintenance	--	7	14	35	40

Wetland Restoration and Evaluation

As shown in Fig. 1, the wetland enhancement work was identified to occur in the southern portion of the Delta for several reasons. The most important being that there were more positive hydrologic conditions present. These wetland areas were severely infested with monocultures of reed canary grass that had displaced essentially all of the native wetland flora. The FS developed

a partnership with DU and obtained funding from BPA and foundations to initiate the enhancement work.

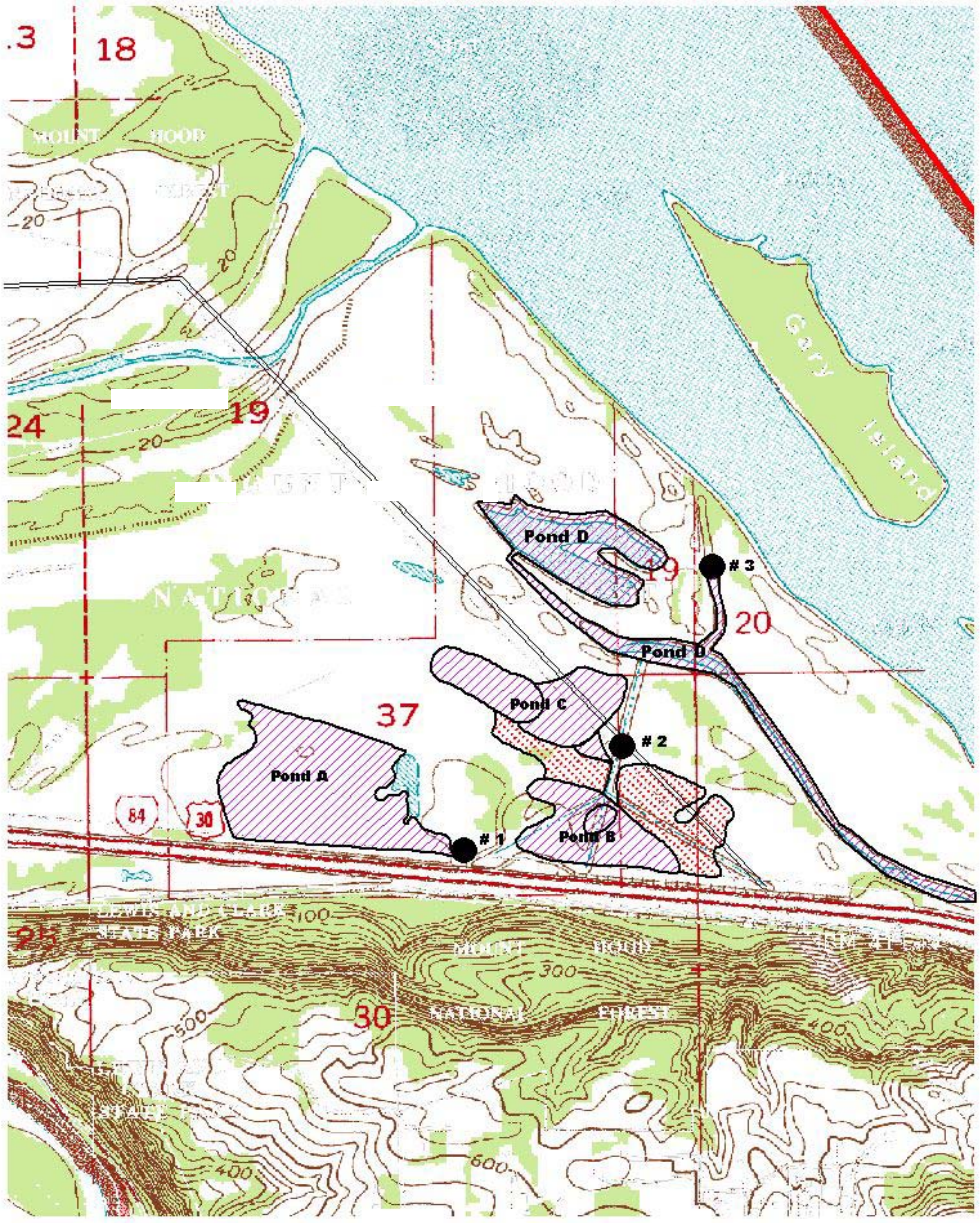
The objective of this wetland work was to create more functional wetlands by increasing the amount of open water/emergent wetlands and thereby decreasing the amount of red canary grass dominated wetlands. This would in turn create more favorable habitat for waterfowl and water dependent birds, herptiles, and other wildlife and native plants.

The work began in 1997 and is summarized below by year. The management approach was similar to the re-forestation effort in that we attempted to be as flexible as possible to respond to lessons learned from previous years using the adaptive management concept.

1997

The first step in the wetlands work was to decipher the hydrological movement of the surface water and to identify those areas which would most likely hold water. The vast majority of the water feeding the wetlands comes from Broughton Bluff south of the freeway and railroad. The water comes onto the Delta via culverts and feeds pond A directly (see Fig. 3, below).

Figure 3: Wetland Restoration Plan



Three water control structures (● #1, 2, and 3) and wetland areas that were excavated at the Delta (pond A, B, C, and D). Red shaded areas adjacent to pond B and C were disced and not excavated. The source of the water for the wetlands is Broughton Bluff located south of the ponds.

Drainage ditches constructed years ago drained the wet areas funneling the surface water into ditches connected to the Columbia River. It was reasoned that water control structures would retain as much surface water as possible in desired wetland areas. These structures were completed in 1997 but were not in operation until fall of 1998 (due to water right issues). A total of about 200 acres would potentially be flooded as result of these structures.

1998

Following recent research from the USFWS (showing that discing reed canary grass in conjunction with flooding resulted in good control), a large disc was purchased in cooperation with USFWS and 200 acres (ponds B, C, and D; pond A was left untouched as a control pond)) were treated in October, 1998 as part of a larger study at several locations in the lower Columbia. However, the benefits of discing result from drying of the roots in the hot summer sun which tends not to occur in October. As a result, this operation was not successful as was reflected in the vegetation data collected as part of this study in the following two years. In addition, bird surveys were on going to determine how waterfowl and other avian species were responding to these wetland changes.

In the fall the water control gates were closed and the wetlands (ponds A, B, C, and D) filled up to capacity during the winter of 1998

1999

The ponded water rapidly receded in July 1999. Vegetation data was collected in July by Ducks Unlimited. Control of reed canary grass was observed to be only effective in areas where the water depths were greater than 12“ and the water was retained through July and into August. In areas where the water was shallow and quickly receded, the reed canary grass was found to be coming back remarkably quickly. Thus, only in portions of pond B and pond D was there good control observed. It was clear that to get a functional wetland either we needed more water to keep the wetlands flooded for longer periods of time, or we needed to deepen the ponds to increase control. As a result of the lack of water, the SRD was dropped from the larger study and this permitted us to explore other treatments. The vegetation data would continue to be collected.

Because water was limiting, money that was to be used for discing was instead used for deepening pond B in the hope of achieving better control effectiveness. Eight acres were deepened in pond B with the vision to deepen more of pond B and pond A in 2000 or 2001. In addition, some 75 acres were disced in mid summer to determine if discing earlier in the year would increase control of reed canary grass.

The areas were well flooded during the winter of 1999.

2000

Again the water receded rapidly in the wetlands in July when the water from Broughton Bluff began to dry up. Even in the deepened areas, the water retention was not extended significantly and not enough to increase the control of reed canary grass. Vegetation monitoring showed a dramatic increase in wetland flora in those areas which were deepened (indicating the presence of a wetland seed bank). However, as indicated above, in areas that dried up in June and early July reed canary grass rapidly re-invaded and became a monoculture in one or two seasons. These observations began to indicate that deepening the wetlands may not alone be the answer to

achieve a functioning wetland system. Clearly, the amount of water available from Broughton Bluff may not be sufficient.

The late summer and winter of 2000 was extremely dry and none of the ponds retained any water during the entire winter.

2001

During the summer of 2001 pond A and B were further deepened creating three islands for habitat diversity. Unless there is a strong reason to excavate more, this completes the excavation of the wetlands for the SRD.

Deepening of wetlands during summer of 2001. A created island is in center of photo.

Continued observations on the vegetation showed that because of the lack of water, many areas that had shown some control of RCG were now becoming heavily infested. It also became more evident, especially after the dry winter of 2000, that additional water was required, if the original design of the wetlands were to be realized on a more consistent basis. We began to explore the possibilities of putting in a well to augment the available water. A water right was applied for and a feasibility study was completed. However, this type of development would change the design from a more passive to more active management system. After much discussion and considering how different the hydrologic Columbia River system is today as a result of upstream dams, it was decided that the more active system would probably be desirable given the potential benefits of developing more functional wetlands for water quality and the flora and fauna.

Action on the well and pump would commence in 2002. Some questions still remain: how much additional water will be required to maintain these wetlands? How much better will the control of RCG be?

Near normal weather conditions in the winter of 2001 resulted in the flooding of all the ponds at full capacity by Feb. 2002. The open water habitat attracted many different species of waterfowl and shorebirds, many that are not normally seen at this site.

Pond A flooded in March 2002 with created island.

2002 and Beyond

With the excavation of the wetlands completed, our attention will turn to water issues and to revegetation of the emergent wetlands and the adjacent uplands. Initial plantings of emergent flora will begin in fall of 2002. Adjacent upland areas will be treated for RCG (spraying and possibly tillage or discing) in preparation for planting in the next 4-5 years. It is hoped that much of the emergent vegetation will come in from the seed bank, but some additional plantings will be initiated to discourage re-infestation by RCG. Because RCG will never be entirely eliminated, it is essential to identify and establish populations of other highly competitive native species.

Wetland Restoration Partnership Summary 1996 -2001

The agencies and groups and the amounts they have committed to wetland restoration (between 1996 and 2001) include:

- Ducks Unlimited: Design, engineering, contract management, monitoring (Value: $65,000).
- U.S. Fish and Wildlife Service: Vegetation Management Project Management (Value: $2,000).
- National Forest Foundation: Cash grant of $15,000 for water control structures.
- National Fish and Wildlife Foundation: Cash grant of $18,000 for water control structures.
- Oregon Department of Fish and Wildlife: Cash grant of $3,000 for water control structures.
- Portland State University: Wetland delineation (Value: $6,000).
- Forest Service "National Demonstration Area": special funding of $40,000.
- US Forest Service: Landowner, cash for water control structures, project oversight (value: $37,500).

Summary: Wetland Restoration, Acres per Year by Activity

Activity	1997	1998	1999	2000	2001
Structures	3	--	--	--	--
Discing	--	200	75	--	--
Deepening	3	--	8	8	45

Removal of Dike across the Original Channel of the Sandy River

A new task added in 2001 was to study the feasibility of breaching or removing the dike over the original Sandy River channel. (The dike was placed by the Oregon Department of Fish in the early 1930's to augment the diminishing smelt run). The first step in examining this opportunity was a hydrologic study to examine feasibility and potential impacts. The results of the feasibility study indicated there would not be negative impacts on river banks or structures (eg interstate bridges) upstream or on the opposite bank. Anadromous fisheries habitat would be improved. The study indicated complete dike removal and removal of accumulated sediment would be the best scenario from a hydrologic standpoint. Next steps in furthering this opportunity would require NEPA analysis, mitigation of a historic structure (the dike was found to be potentially eligible for the National Register of Historic Places), necessary permits, design/engineering and finally, dike and silt removal. As these steps require a multi-year commitment, we applied for 3 year funding for 2003-2005 in the Lower Columbia solicitation.

Establish HEP Values

Field work and a report were completed by John Ratti at University of Idaho.

GIS Development for SRD

A distinct, Arc Info/Arc View database was developed for Sandy River Delta. Both electronic (ArcInfo and AutoCad files) and paper maps were complied into one coordinated system. Base layers such as wetlands and vegetation were included, as were planning maps such as the EIS selected alternative, the riparian reforestation design and the wetland enhancement design. Historic aerial photos were scanned (although not spatially referenced) for use in presentations.

Conclusion

The above summary of the progress at SRD illustrates a learning experience. We have attempted to move slowly, learning as we go, and with the decided approach to change our direction based on the results of the previous year. On one hand, this has been difficult in that our short-term goals tend to change rapidly, but on the other hand the solutions and results have been very rewarding. The long-term goals have always remained as beacons; it becomes a question as to how one reaches them. Because we started with small areas, mistakes were also limited to small areas.

As a result the planning, design, and implementation of the project evolves as we learn. This requires a constant monitoring effort that is not always steeped in scientific data, but rather is gathered with the objective to give immediate feed back to subsequent planning, design and implementation. As our designs become more stable, more stable monitoring is being developed. During the last two years permanent photo points and transects have been established to document vegetation changes in both the re-forestation and wetland efforts. These data will be collected over several years to detect and illustrate trends.